

Distributed Learning Interoperability with Embedded Training and Intelligent Tutors

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High Level Project Goals

- **Embedded Trainer compatibility**
 - Prototype a framework in which a SCORM course can include training events in the embedded or facility based setting
 - Simplify / automate the transition for the learner
- **Intelligent Tutoring System interoperability**
 - ITSs have been effective where instructor availability is limited
 - ITSs enhance experiential training by focusing virtual events on learning objectives
 - Exploit native ITS assessment capabilities
 - ITS evaluation principles parallel to SCORM learning objectives

Training Use Case Details

- **Standalone**
 - The training system resides on entirely different hardware from that where the browser-based course is presented.
- **Networked**
 - Connectivity between the training system and the browser machine.
- **Stateless**
 - Training events conducted start to finish.

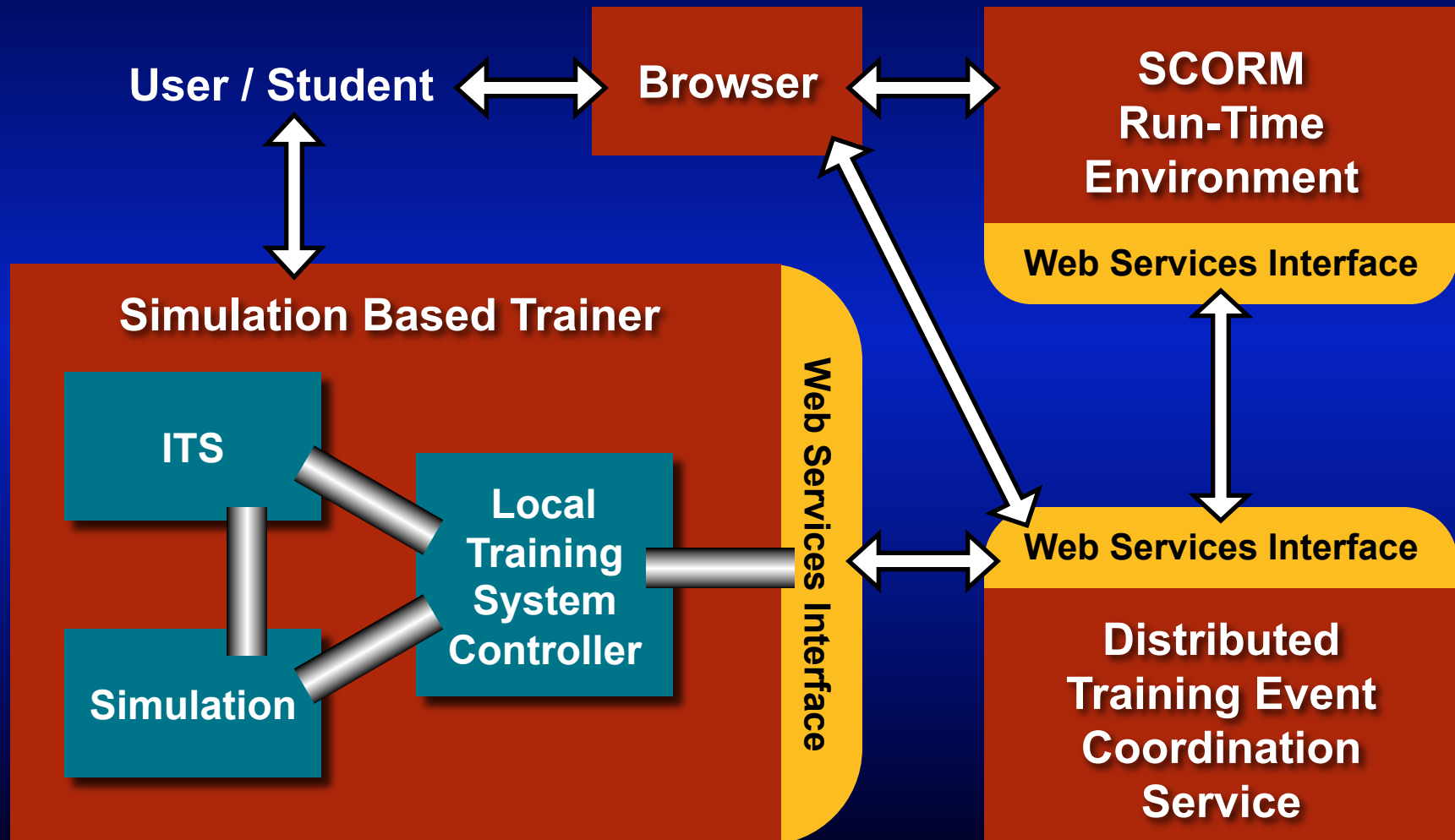
Existing Interoperability Concept

- **DTECS**
 - Distributed Training Event Coordination Service
 - Allow for a simulation based training event to be inserted in a course similar to a SCO
- **Previous existing DTECS implementation**
 - Developed by BBN, based on DARWARS work
 - Server based DTECS service
 - Coordinates individual or team events through a lobby
 - Registration data associates available training events with learning objectives
 - Training simulation must run on browser machine
 - Scores from training event reported from browser machine

Primary Technical Goals

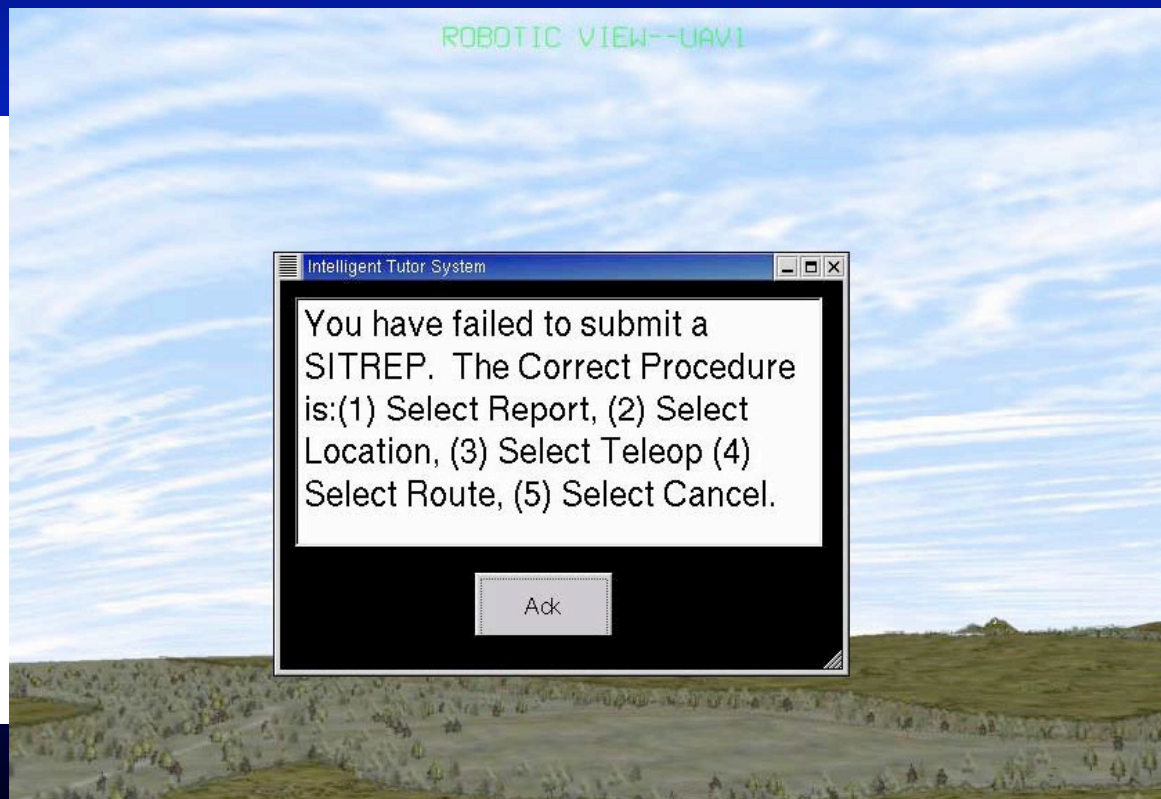
- **Collaborate with BBN on DTECS modification**
 - Accommodate training event external to browser
 - Direct DTECS communication with trainer
- **Build the Local Training System Controller (LTSC)**
 - Resides on the training system hardware
 - Web services interface
 - Receive launch information from DTECS
 - Send scores directly back to DTECS
 - Local configuration and launch of a training event
- **Map ITS principles to SCORM learning objectives**
 - Representational scheme for flexible weighting and tabulation methods for multiple evaluations
 - 38 ITS evaluations mapped to 12 learning objectives

Architecture



Embedded Training Platform – C2V ITS

Command and Control Vehicle embedded trainer testbed with integrated Intelligent Structured Trainer providing automated evaluation



C2V Testbed



Represents a crewstation in a Future Combat Systems command and control vehicle, for controlling unmanned ground and air assets

Prototype Demonstration Sequence

- **Two course blocks**
 - Beginner – basic C2V operations
 - Control, reporting
 - Advanced – C2V tactical operation
 - Reconnaissance, movement, and engagement principles
 - Each block provides:
 - Didactic browser-based content
 - Simulation-based training event and assessment
 - Automated launch process and data transfer between the browser course environment and the standalone trainer
- **Sequence**
 - First course block
 - Course, training event, remediation, follow-up training event

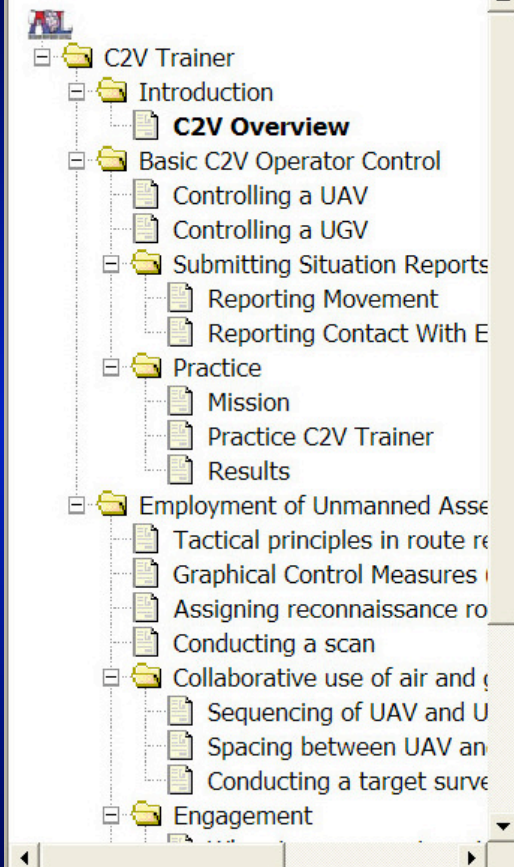


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C2V Operator Control Course

The C2V Operator Control course provides instruction in the operation of a Command and Control Vehicle (C2V) crewstation employing unmanned robotic vehicles. In this course, you will have the opportunity to see an overview of C2V operational concepts, followed by hands-on practice in a training simulation, performing tasks in the following operational context:

- Conduct reconnaissance and surveillance operations
- Execute fire and maneuver before contact, in contact, and during assault to close with and destroy the enemy
- Provide mutual support in overwatch and cooperative engagements
- Conduct offensive, defensive, stability and support operations
- Conduct security operations (counter-reconnaissance)

Before entering the course, you will need to identify your existing level of familiarity with C2V operations.

Beginning users

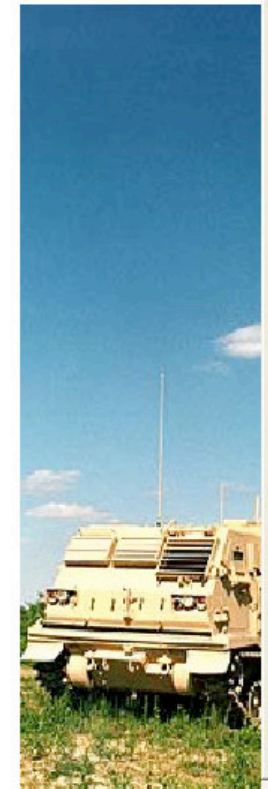
If you are new to the C2V crewstation, you will be directed to an overview of C2V operator control, covering topics such as how to control unmanned aerial vehicles (UAVs) and unmanned ground vehicles (UGVs) from the C2V crewstation.

Beginner

Experienced users

If you have experience in the basics of controlling robotic vehicles through the C2V crewstation, you will be taken directly to more advanced concepts in

Advanced



Course introduction



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- C2V Trainer
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 - C2V Overview
 - Basic C2V Operator Control
 - Controlling a UAV**
 - Controlling a UGV
 - Submitting Situation Reports
 - Reporting Movement
 - Reporting Contact With E
 - Practice
 - Mission
 - Practice C2V Trainer
 - Results
 - Employment of Unmanned Assets
 - Tactical principles in route re
 - Graphical Control Measures
 - Assigning reconnaissance ro
 - Conducting a scan
 - Collaborative use of air and g
 - Sequencing of UAV and U
 - Spacing between UAV and
 - Conducting a target surve
 - Engagement

Basic C2V Crewstation Operation - Controlling UAVs

An unmanned aerial vehicle (UAV) is controlled in the C2V Crewstation interface through the UGV Status window.



Block 1 course topic

Flying a UAV

1. Take control of the UAV
2. Assign the UAV a HOVER task
 - o Select **ASSIGN TASK**
 - o Select **HOVER**



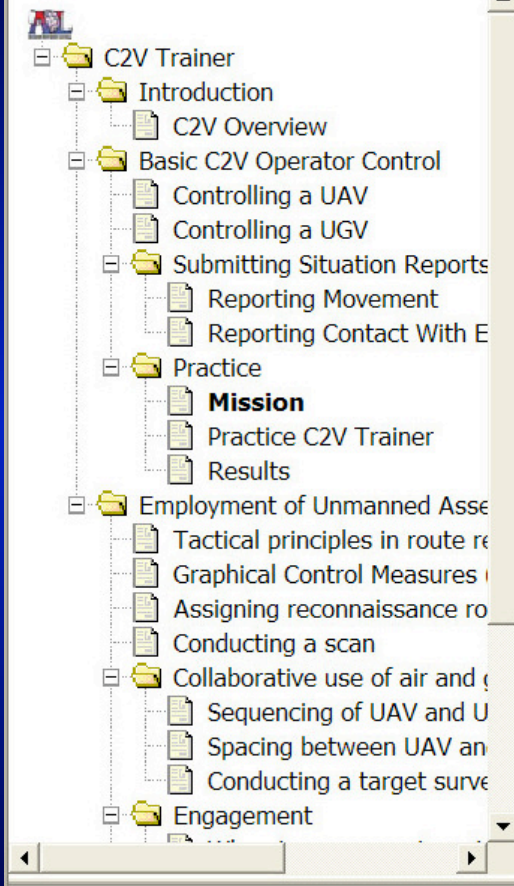
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Basic C2V Crewstation Operation - Exercise

You will be directed to a simulation based exercise where you can perform basic C2V crewstation operations from the preceding course topics. For this exercise, your objective is to perform the following in any order:

- Assign a UAV to move to one checkpoint
- Send movement SITREPs upon movement
- Conduct a scan with the UAV once it is hovering
- If any enemy is observed, send an observation SITREP

Once you have performed these tasks, you can conclude the exercise.

Exercise Instructions

After reading this page and proceeding your next step is to go to the C2V Crewstation trainer and follow this sequence:

1. Start the exercise with the **Start Sim** button
2. Log in using the same username and password as you use for this course
3. This will present a popup to start the exercise - click OK
4. Upon completion of the above tasks in the exercise, please exit the simulation using the **Exit** button, and return to this course for assessment results.

Block 1 exercise
instructions



Log In

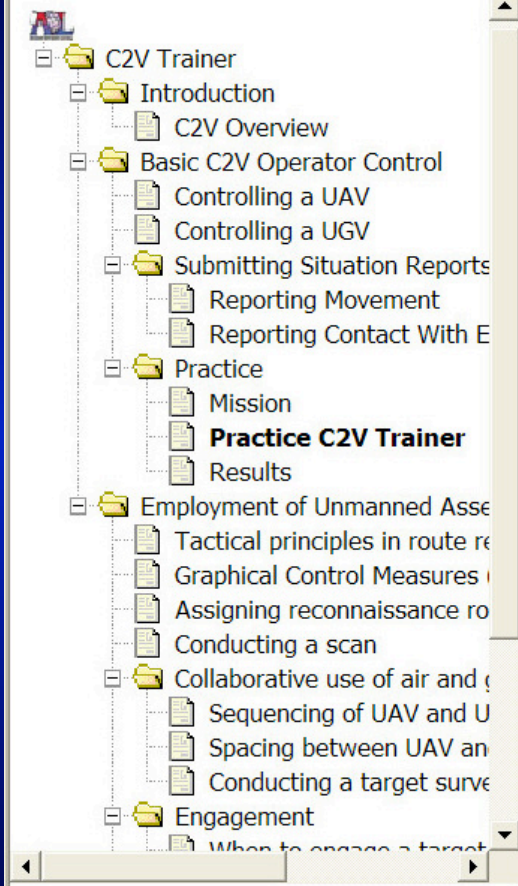
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You have selected to begin a training simulation. Once the simulation has begun, you will not be able to navigate to any part of this course until the simulation has completed.

Please select the name of the DTECS service you would like to employ:

Local

Click here to begin!

Block 1 exercise,
find available DTECS



Dell, Gary
2007-Dec-12 at 20:37 GMT

Basic Operations Event 15

EVENT LOBBY

Training Pkg Basic Operations

Time This event is imminent.

Description [Description]

You are in the lobby for a training event where participants meet before a training session. Click the "Ready" button to indicate you are ready and wait for other participants to arrive. Click the "Wait" button to indicate you are no longer ready. You can also [leave the lobby](#).

Current Participants (All required roles are satisfied)

Role	User	Billet	Ready	Actions
Beginner Student	gdell		<input checked="" type="radio"/>	<input type="button" value="Wait"/> <input type="button" value="Withdraw"/>

Block 1 exercise,
DTECS event lobby

Start the training
session

Session Master gdell



Dell, Gary
2007-Dec-12 at 20:37 GMT

Basic Operations Event 15

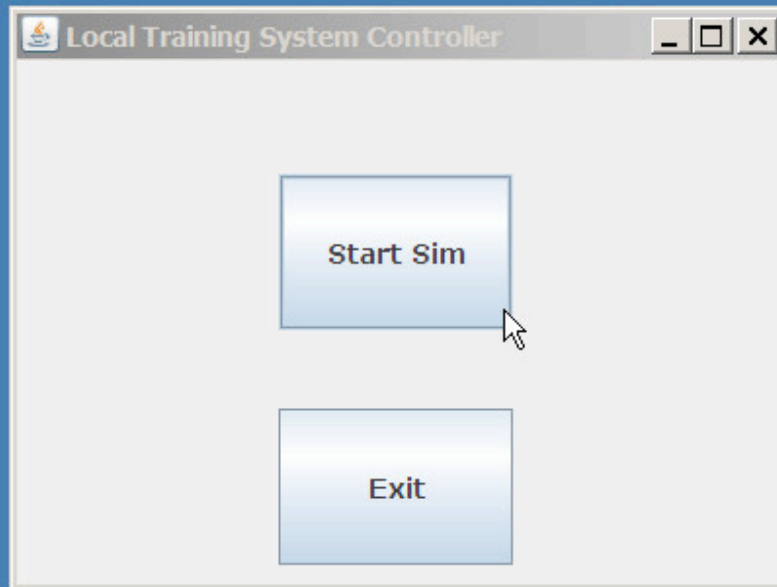
EVENT HOME

Basic Operations Event 15 launched.

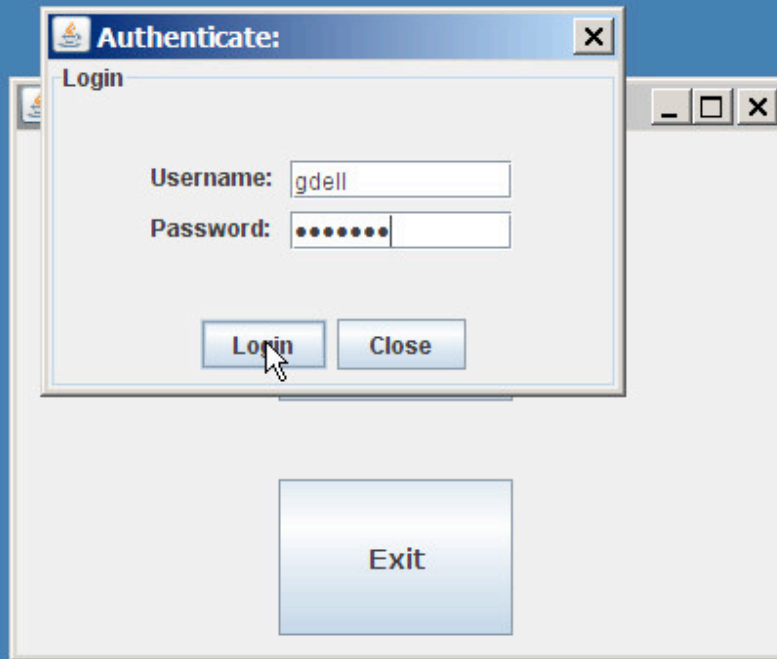
When your training session has completed, [refresh](#) this page.

Status: The training session has begun.

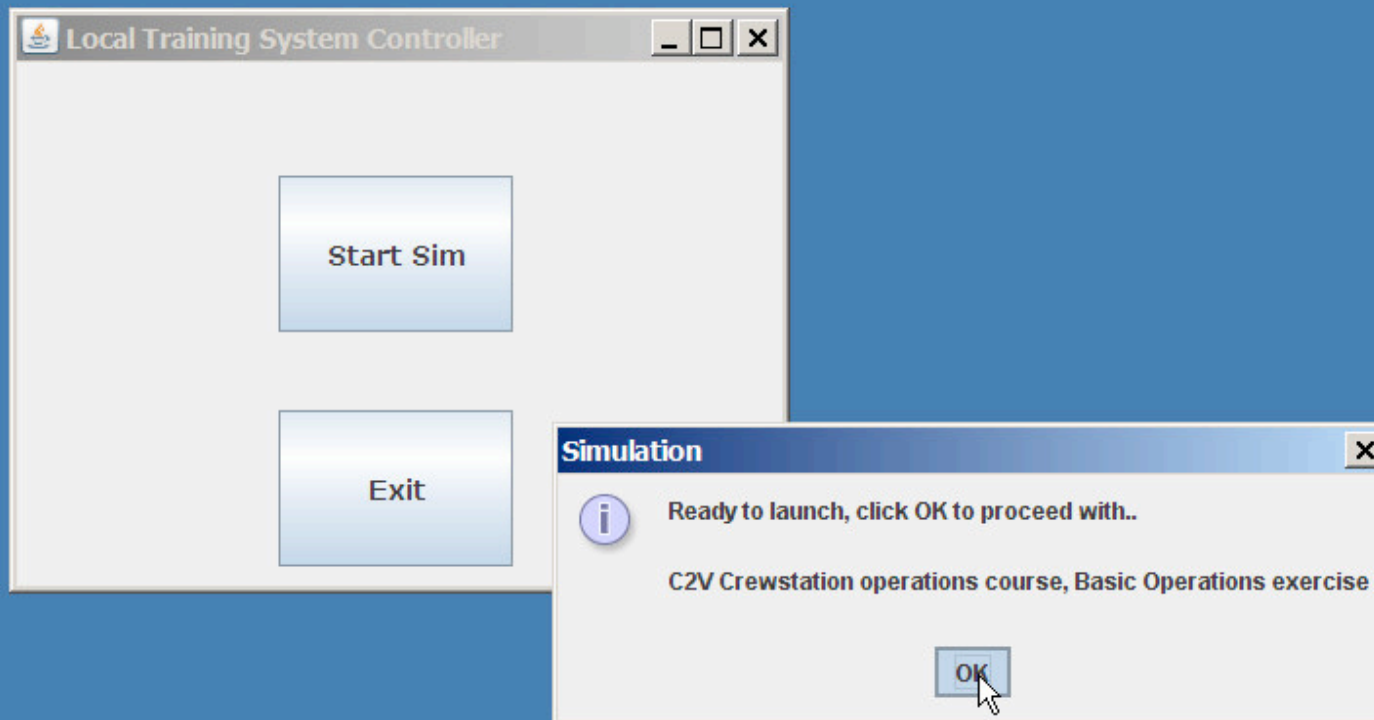
Block 1 exercise,
launched from browser



Block 1 exercise,
LTSC on trainer



Block 1 exercise,
LTSC authentication



Block 1 exercise,
LTSC launch



Block 1 exercise,
on C2V crewstation



Log In

Version 1.0



Dell, Gary
2007-Dec-12 at 20:44 GMT

Basic Operations Event 15

EVENT HOME

Training Pkg [Basic Operations](#)

Time Started on 2007-Dec-12 at 20:37 GMT.

Description [Description]

You are viewing the home page of an event that has been started, but not finished. When the training event concludes you may view summary information about the event.

Event Participants

Role	User	Objective	Score
Beginner Student	gdell	Controlling UAV	1:1
Beginner Student	gdell	Controlling UGV	1:1
Beginner Student	gdell	Submitting SITREPS for Movement	0:1
Beginner Student	gdell	Basic Operations.Beginner Student	0:1
Beginner Student	gdell	Submitting SITREPS for Contacting With Enemy	1:1
Beginner Student	gdell	Basic Operations.Beginner Student	100:37.1

View scores to be sent to the SCORM RTE, and choose to either report or abort.

Continue

Block 1 exercise,
scores from trainer

One learning objective
not passed



Log In

Suspend

Quit

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 - Engagement
 - When to engage a target
 - Line of Sight (LOS) enga

C2V Operator Control Course - Basic Operations Exercise Assessment

Based on the preceding exercise, you have not demonstrated mastery of all topics in the Basic Operations course section. You will be directed to the lessons that you need to review.

Block 1 exercise,
remediation required



Log In

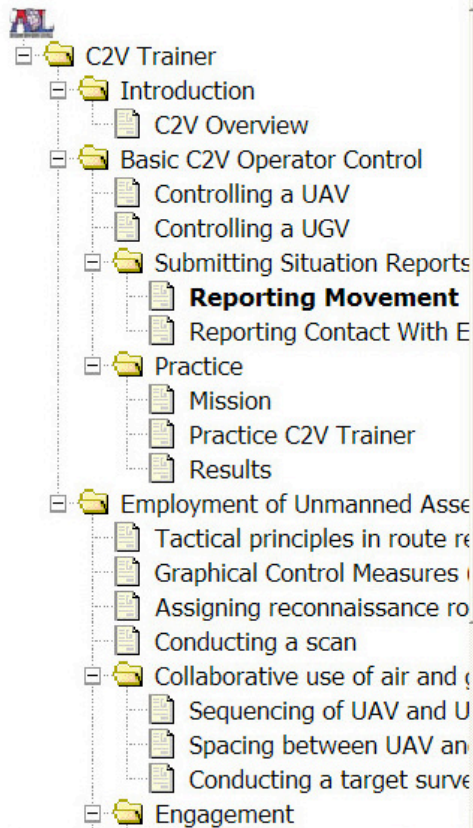
Suspend

Quit

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Basic C2V Crewstation Operation - Reporting Movement

Situational reports (SITREPs) are essential to coordinated operations. A movement SITREP should always be submitted immediately in these conditions:

- When a UAV or UGV leaves a checkpoint, a movement SITREP should be sent
- When a UAV or UGV arrives at a checkpoint, a location SITREP should be sent



Block 1
remedial courseware



Dell, Gary
2008-May-12 at 21:14 GMT

Basic Operations Event 18

EVENT HOME

Basic Operations Event 18 launched.

When your training session has completed, [refresh](#) this page.

Status: The training session has begun.

Block 1
remedial exercise



Dell, Gary
2008-May-12 at 21:52 GMT

Basic Operations Event 18

EVENT HOME

Training Pkg [Basic Operations](#)

Time Started on 2008-May-12 at 21:14 GMT.

Description [Description]

You are viewing the home page of an event that has been started, but not finished. When the training event concludes you may view summary information about the event.

Event Participants

Role	User	Objective	Score
Beginner Student	gdell	Controlling UAV	1:1
Beginner Student	gdell	Controlling UGV	1:1
Beginner Student	gdell	Submitting SITREPS for Movement	1:1
Beginner Student	gdell	Basic Operations.Beginner Student	8:1
Beginner Student	gdell	Submitting SITREPS for Contacting With Enemy	1:1
Beginner Student	gdell	Basic Operations.Beginner Student	100:12.3

Block 1
new exercise scores

All learning objectives
passed

Continue



Dell, Gary
2008-May-12 at 21:52 GMT

Report Scores

Welcome

Objective	Score
Controlling UAV	1 ▲
Controlling UGV	1
Submitting SITREPS for Contacting With Enemy	1 ▼
Submitting SITREPS for Movement	1

Some objectives have been tried. Click the 'Report Scores' button to return the simulation without reporting scores.

ViewDetails

Report Scores

click [here](#) to abort

Report your scores to the SCORM RTE and return to your lesson

Block 1 scores reported to RTE



Suspend

Quit

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 - Line of Sight (LOS) enga

C2V Operator Control Course - Basic Operations Exercise Assessment

Based on the preceding exercise, you have demonstrated mastery of the topics in the Basic Operations course section. You will now be directed to the next section of the course.

Block 1 completion



Suspend

Quit

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Version 1.0

- Submitting Situation Reports
 - Reporting Movement
 - Reporting Contact With E
- Practice
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- Engagement
 - When to engage a target
 - Line of Sight (LOS) engag
 - Cooperative engagement
- Practice
 - Mission
 - Practice C2V Trainer
 - Results**

Results

C2V Operator Control Course - Conclusion

Congratulations! You have demonstrated mastery of this course, and the results will be saved with your learner profile.



Successful completion,
Blocks 1 & 2

Potential Future Research

- Generalize methods for mapping learning objectives
- Generalize methods for reasoning about choice of exercise scenarios
- Allow the browser session to be released
- Support bookmarking training events
- Potential SCORM 2.0 recommendations
 - Persistence of past performance data